CHAPTER SIX
Electron Configuration

6.1 What is electron configuration? Describe the roles that the Pauli exclusion principle and Hund's rule play in writing the electron configuration of elements.

6.2 Explain the meaning of the symbol $4d^6$.

6.3 Explain the meaning of diamagnetic and paramagnetic. Give an example of an atom that is diamagnetic and one that is paramagnetic. What does it mean when we say that electrons are paired?

6.4 What is meant by the term "shielding of electrons" in an atom? Using the Li atom as an example, describe the effect of shielding on the energy of electrons in an atom.

6.5 Define the following terms and give an example of each: transition metals, lanthanides, actinides.

6.6 Explain why the ground-state electron configurations of Cr and Cu are different from what we might expect.

6.7 Explain what is meant by a noble gas core. Write the electron configuration of a xenon core.

6.8 Comment on the correctness of the following statement: The probability of finding two electrons with the same four quantum numbers in an atom is zero.

6.9 Indicate which of the following sets of quantum numbers in an atom are unacceptable and explain why:
(a) (1, 0, ½, ½), (b) (3, 0, 0, + ½), (c) (2, 2, 1, +½), (d) (4, 3, -2, + ½), (e) (3, 2, 1, 1).

6.10 The ground-state electron configurations listed here are incorrect. Explain what mistakes have been made in each and write the correct electron configurations.
Al: $1s^2 2s^2 2p^4 3s^2 3p^3$
B: $1s^2 2s^2 2p^5$
F: $1s^2 2s^2 2p^6$

6.11 The atomic number of an element is 73. Are the atoms of this element diamagnetic or paramagnetic?

6.12 Indicate the number of unpaired electrons present in each of the following atoms: B, Ne, P, Sc, Mn, Se, Kr, Fe, Cd, I, Pb.

6.13 Write the ground-state electron configurations for the following elements: B, V, Ni, As, I, Au.

6.14 Write the ground-state electron configurations for the following elements: Ge, Fe, Zn, Ni, W, Tl.

6.15 The electron configuration of a neutral atom is $1s^2 2s^2 2p^6 3s^2$. Write a complete set of quantum numbers for each of the electrons. Name the element.

6.16 Which of the following species has the most unpaired electrons? S^+, S, or S^-. Explain how you arrive at your answer.

6.17 The electron configurations described in this chapter all refer to gaseous atoms in their ground states. An atom may absorb a quantum of energy and promote one of its electrons to a higher-energy orbital. When this happens, we say that the atom is in an excited state. The electron configurations of some excited atoms are given. Identify these atoms and write their ground-state configurations:
(a) $1s^1 2s^1$
(b) $1s^2 2s^2 2p^2 3d^1$
(c) $1s^2 2s^2 2p^6 4s^1$
(d) $[Ar]4s^1 3d^{10} 4p^4$
(e) $[Ne]3s^2 3p^4 3d1$

6.18 Draw orbital diagrams for atoms with the following electron configurations:
(a) $1s^2 2s^2 2p^5$
(b) $1s^2 2s^2 2p^6 3s^2 3p^3$
(c) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$